Supplemental Mathematical Operators

Range: 2A00–2AFF

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The Unicode Standard, Version 14.0

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See https://www.unicode.org/charts/PDF/Unicode-14.0/ for charts showing only the characters added in Unicode 14.0.
See https://www.unicode.org/Public/14.0.0/charts/ for a complete archived file of character code charts for Unicode 14.0.

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These charts are provided as the online reference to the character contents of the Unicode Standard, Version 14.0 but do
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#9, #11, #14, #15, #24, #29, #31, #34, #38, #41, #42, #44, #45, and #50, the other Unicode Technical Reports and Standards,
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See https://www.unicode.org/ucd/ and https://www.unicode.org/reports/

A thorough understanding of the information contained in these additional sources is required for a successful
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### Supplemental Mathematical Operators

**2A42** UNION WITH OVERBAR
**2A43** INTERSECTION WITH OVERBAR
**2A44** INTERSECTION WITH LOGICAL AND
**2A45** UNION WITH LOGICAL OR
**2A46** UNION ABOVE INTERSECTION
**2A47** INTERSECTION ABOVE UNION
**2A48** UNION ABOVE BAR ABOVE INTERSECTION
**2A49** INTERSECTION ABOVE BAR ABOVE UNION
**2A4A** UNION BESIDE AND JOINED WITH INTERSECTION
**2A4B** INTERSECTION BESIDE AND JOINED WITH INTERSECTION
**2A4C** CLOSED UNION WITH SERIFS
**2A4D** CLOSED INTERSECTION WITH SERIFS
**2A4E** DOUBLE SQUARE INTERSECTION
**2A4F** DOUBLE SQUARE UNION
**2A50** CLOSED UNION WITH SERIFS AND SMASH PRODUCT

### Logical ands and ors

**2A51** LOGICAL AND WITH DOT ABOVE
**2A52** LOGICAL OR WITH DOT ABOVE
**2A53** DOUBLE LOGICAL AND
**2A54** DOUBLE LOGICAL OR
**2A55** TWO INTERSECTING LOGICAL AND
**2A56** TWO INTERSECTING LOGICAL OR
**2A57** SLOPING LARGE OR
**2A58** SLOPING LARGE AND
**2A59** LOGICAL OR OVERLAPPING LOGICAL AND
**2A5A** LOGICAL AND WITH MIDDLE STEM
**2A5B** LOGICAL OR WITH MIDDLE STEM
**2A5C** LOGICAL AND WITH HORIZONTAL DASH
**2A5D** LOGICAL OR WITH HORIZONTAL DASH
**2A5E** LOGICAL AND WITH DOUBLE OVERBAR
**2A5F** LOGICAL AND WITH UNDERBAR
**2A60** LOGICAL OR WITH DOUBLE UNDERBAR
**2A61** SMALL VEE WITH UNDERBAR
**2A62** LOGICAL OR WITH DOUBLE UNDERBAR
**2A63** LOGICAL OR WITH DOUBLE UNDERBAR

### Miscellaneous mathematical operators

**2A64** Z NOTATION DOMAIN ANTIRESTRICTION
**2A65** Z NOTATION RANGE ANTIRESTRICTION

### Relational operators

**2A66** EQUALS SIGN WITH DOT BELOW
**2A67** IDENTICAL WITH DOT ABOVE
**2A68** TRIPLE HORIZONTAL BAR WITH DOUBLE VERTICAL STROKE
**2A69** TRIPLE HORIZONTAL BAR WITH TRIPLE VERTICAL STROKE
**2A6A** TILDE OPERATOR WITH DOT ABOVE
**2A6B** TILDE OPERATOR WITH RISING DOTS
**2A6C** SIMILAR MINUS SIMILAR
**2A6D** CONGRUENT WITH DOT ABOVE
**2A6E** EQUALS WITH ASTERISK
**2A6F** ALMOST EQUAL TO WITH CIRCUMFLEX ACCENT
**2A70** APPROXIMATELY EQUAL OR EQUAL TO
**2A71** EQUALS SIGN ABOVE PLUS SIGN
**2A72** PLUS SIGN ABOVE EQUALS SIGN
**2A73** EQUALS SIGN ABOVE TILDE OPERATOR
**2A74** DOUBLE COLON EQUAL
**2A75** TWO CONSECUTIVE EQUALS SIGNS
**2A76** THREE CONSECUTIVE EQUALS SIGNS
**2A77** EQUALS SIGN WITH TWO DOTS ABOVE
**2A78** EQUIVALENT WITH FOUR DOTS ABOVE
**2A79** LESS-WITH CIRCLE INSIDE
**2A7A** GREATER-WITH CIRCLE INSIDE
**2A7B** LESS-WITH QUESTION MARK ABOVE
**2A7C** GREATER-WITH QUESTION MARK ABOVE
**2A7D** LESS-OR SLANTED EQUAL TO
**2A7E** GREATER-OR SLANTED EQUAL TO
**2A7F** GREATER-OR SLANTED EQUAL TO WITH DOT INSIDE
**2A80** GREATER-OR SLANTED EQUAL TO WITH DOT INSIDE
**2A81** LESS-OR SLANTED EQUAL TO WITH DOT ABOVE
**2A82** GREATER-OR SLANTED EQUAL TO WITH DOT ABOVE
**2A83** LESS-OR SLANTED EQUAL TO WITH DOT ABOVE RIGHT
**2A84** GREATER-OR SLANTED EQUAL TO WITH DOT ABOVE LEFT
**2A85** LESS-OR APPROXIMATE
**2A86** GREATER-OR APPROXIMATE
**2A87** LESS-AND SINGLE-LINE NOT EQUAL TO
**2A88** GREATER-AND SINGLE-LINE NOT EQUAL TO
**2A89** LESS-AND NOT APPROXIMATE
**2A8A** GREATER-AND NOT APPROXIMATE
**2A8B** LESS-AND ABOVE DOUBLE-LINE EQUAL ABOVE GREATER-THEAN
**2A8C** GREATER-AND ABOVE DOUBLE-LINE EQUAL ABOVE LESS-THEAN
**2A8D** LESS-THEAN ABOVE SIMILAR OR EQUAL
**2A8E** GREATER-THEAN ABOVE SIMILAR OR EQUAL
**2A8F** LESS-THEAN ABOVE SIMILAR ABOVE GREATER-THEAN
| U+2A90 | GREATER-THEAN ABOVE SIMILAR ABOVE LESS-THAN |
| U+2A91 | LESS-THEAN ABOVE GREATER-THEAN ABOVE DOUBLE-LINE EQUAQL |
| U+2A92 | GREATER-THEAN ABOVE LESS-THEAN ABOVE DOUBLE-LINE EQUAQL |
| U+2A93 | LESS-THEAN ABOVE SLANTED EQUAQL ABOVE GREATER-THEAN ABOVE SLANTED EQUAQL |
| U+2A94 | GREATER-THEAN ABOVE SLANTED EQUAQL ABOVE LESS-THEAN ABOVE SLANTED EQUAQL |
| U+2A95 | SLANTED EQUAQL TO OR LESS-THEAN |
| U+2A96 | EQUAL TO OR GREATER-THEAN |
| U+2A97 | SLANTED EQUAQL TO OR LESS-THEAN WITH DOT INSIDE |
| U+2A98 | SLANTED EQUAQL TO OR GREATER-THEAN WITH DOT INSIDE |
| U+2A99 | DOUBLE-LINE EQUAQL TO OR LESS-THEAN |
| U+2A9A | DOUBLE-LINE EQUAQL TO OR GREATER-THEAN |
| U+2A9B | DOUBLE-LINE SLANTED EQUAQL TO OR LESS-THEAN |
| U+2A9C | DOUBLE-LINE SLANTED EQUAQL TO OR GREATER-THEAN |
| U+2A9D | SIMILAR OR LESS-THEAN |
| U+2A9E | SIMILAR OR GREATER-THEAN |
| U+2A9F | SIMILAR ABOVE LESS-THEAN ABOVE EQUAQLSIGN |
| U+2AA0 | SIMILAR ABOVE GREATER-THEAN ABOVE EQUAQLSIGN |
| U+2AA1 | DOUBLE NESTED LESS-THEAN |
| U+2AA2 | DOUBLE NESTED GREATER-THEAN |
| U+2AA3 | DOUBLE NESTED LESS-THEAN WITH UNDERBAR |
| U+2AA4 | GREATER-THEAN OVERLAPPING LESS-THEAN |
| U+2AA5 | GREATER-THEAN ABOVE BESIDE LESS-THEAN |
| U+2AA6 | LESS-THEAN CLOSED BY CURVE |
| U+2AA7 | GREATER-THEAN CLOSED BY CURVE |
| U+2AA8 | LESS-THEAN CLOSED BY CURVE ABOVE SLANTED EQUAQL |
| U+2AA9 | GREATER-THEAN CLOSED BY CURVE ABOVE SLANTED EQUAQL |
| U+2AAA | SMALLER THAN |
| U+2AAB | LARGER THAN |
| U+2AAC | SMALLER THAN OR EQUAL TO |
| U+2AAD | LARGER THAN OR EQUAL TO |
| U+2AAE | EQUAQLSIGN WITH BUMPY ABOVE |
| U+2AAF | PRECEDES ABOVE SINGLE-LINE EQUAQLSIGN |
| U+2AB0 | SUCCEEDS ABOVE SINGLE-LINE EQUAQLSIGN |
| U+2AB1 | PRECEDES ABOVE SINGLE-LINE NOT EQUAL TO |
| U+2AB2 | SUCCEEDS ABOVE SINGLE-LINE NOT EQUAL TO |
| U+2AB3 | PRECEDES ABOVE EQUALS SIGN |
| U+2AB4 | SUCCEEDS ABOVE EQUALS SIGN |
| U+2AB5 | PRECEDES ABOVE NOT EQUAL TO |
| U+2AB6 | SUCCEEDS ABOVE NOT EQUAL TO |
| U+2AB7 | PRECEDES ABOVE ALMOST EQUAL TO |
| U+2AB8 | SUCCEEDS ABOVE ALMOST EQUAL TO |
| U+2AB9 | PRECEDES ABOVE NOT ALMOST EQUAL TO |
| U+2ABA | SUCCEEDS ABOVE NOT ALMOST EQUAL TO |
| U+2ABB | DOUBLE PRECEDES |
| U+2ABC | DOUBLE SUCCEEDS |

**Subset and superset relations**
| U+2ABD | SUBSET WITH DOT |
| U+2ABE | SUPERSET WITH DOT |
| U+2ABF | SUBSET WITH PLUS SIGN BELOW |
| U+2AC0 | SUPERSET WITH PLUS SIGN BELOW |
| U+2AC1 | SUBSET WITH MULTIPLICATION SIGN BELOW |
| U+2AC2 | SUPERSET WITH MULTIPLICATION SIGN BELOW |
| U+2AC3 | SUBSET OF OR EQUAL TO WITH DOT ABOVE |
| U+2AC4 | SUPERSET OF OR EQUAL TO WITH DOT ABOVE |
| U+2AC5 | SUBSET OF ABOVE EQUALS SIGN |
| U+2AC6 | SUPERSET OF ABOVE EQUALS SIGN |
| U+2AC7 | SUBSET OF ABOVE TILDE OPERATOR |
| U+2AC8 | SUPERSET OF ABOVE TILDE OPERATOR |
| U+2AC9 | SUBSET OF ABOVE ALMOST EQUAL TO |
| U+2ACA | SUPERSET OF ABOVE ALMOST EQUAL TO |
| U+2ACB | SUBSET OF ABOVE NOT EQUAL TO |
| U+2ACC | SUPERSET OF ABOVE NOT EQUAL TO |

**Forks**
| U+2ADB | ELEMENT OF OPENING DOWNWARDS |
| U+2ADE | ELEMENT OF |
| U+2AEE | ELEMENT OF OPENING UPWARDS |
| U+2AFA | PITCHFORK WITHTEE TOP |
| U+2AFB | TRANSVERSAL INTERSECTION |
| U+2ACF | FORKING |

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**2ADD Supplemental Mathematical Operators 2AFF**

**2ADD ⊿ NONFORKING**

= independent
= an equational logic symbol, not a computing science symbol
= independence (original concept) is related to non-forking

**Tacks and turnstiles**

2ADE ⊿ SHORT LEFT TACK

→ 22A3 ⊿ left tack

2ADF ⊷ SHORT DOWN TACK

→ 22A4 ⊷ down tack

2AE0 ⊷ SHORT UP TACK

→ 22A5 ⊷ up tack

2AE1 ⊷ PERPENDICULAR WITH S

2AE2 ⊾ VERTICAL BAR TRIPLE RIGHT TURNSTILE

= ordinarily satisfies

2AE3 ⊾ DOUBLE VERTICAL BAR LEFT TURNSTILE

→ 22A9 ⊾ forces

2AE4 ⊢ VERTICAL BAR DOUBLE LEFT TURNSTILE

→ 22A8 ⊢ true

2AE5 ⊢ DOUBLE VERTICAL BAR DOUBLE LEFT TURNSTILE

2AE6 ⊢ LONG DASH FROM LEFT MEMBER OF DOUBLE VERTICAL

→ 22A9 ⊢ forces

2AE7 ⪗ SHORT DOWN TACK WITH OVERBAR

→ 22A4 ⪗ down tack

→ 2351 ⪗ apl functional symbol up tack overbar

→ 3012 ⪗ postal mark

2AE8 ⊘ SHORT UP TACK WITH UNDERBAR

→ 22A5 ⊘ up tack

→ 234A ⊘ apl functional symbol down tack underbar

2AE9 ⊘ SHORT UP TACK ABOVE SHORT DOWN TACK

2AEA ⊘ DOUBLE DOWN TACK

2AEB ⊘ DOUBLE UP TACK

= independence
= probability theory

2AEC ⊘ DOUBLE STROKE NOT SIGN

→ 00AC ⊘ not sign

2AED ⊘ REVERSED DOUBLE STROKE NOT SIGN

→ 234A ⊘ reversed not sign

**Vertical line operators**

2AEE ⊿ DOES NOT DIVIDE WITH REVERSED NEGATION SLASH

→ 2224 ⊿ does not divide

2AEF ⊿ VERTICAL LINE WITH CIRCLE ABOVE

2AF0 ⊿ VERTICAL LINE WITH CIRCLE BELOW

2AF1 ⊿ DOWN TACK WITH CIRCLE BELOW

= necessarily satisfies

→ 27DF ⊿ up tack with circle above

2AF2 ⊿ PARALLEL WITH HORIZONTAL STROKE

→ 2226 ⊿ not parallel to

→ 27CA ⊿ vertical bar with horizontal stroke

2AF3 ⊿ PARALLEL WITH TILDE OPERATOR

2AF4 ⊿ PARALLEL WITH TILDE OPERATOR

= interleave

→ 2980 ⊿ triple vertical bar delimiter

2AF5 ⊿ PARALLEL WITH TILDE OPERATOR

= vertical bar with horizontal stroke

**Miscellaneous mathematical operator**

2AF6 : TRIPLE COLON OPERATOR

= logic

→ 205D : tricolon

→ 22EE : vertical ellipsis

**Relations**

2AF7 ≪ TRIPLE NESTED LESS-THAN

→ 22D8 ≪ very much less-than

2AF8 ≫ TRIPLE NESTED GREATER-THAN

→ 22D9 ≫ very much greater-than

2AF9 ≍ DOUBLE-LINE SLANTED LESS-THAN OR EQUAL TO

→ 2266 ≍ less-than over equal to

2AFA ≏ DOUBLE-LINE SLANTED GREATER-THAN OR EQUAL TO

→ 2267 ≏ greater-than over equal to

2AFB // TRIPLE SOLIDUS BINARY RELATION

→ 2AF4 // triple vertical bar binary relation

**Operators**

2AFD // LARGE TRIPLE VERTICAL BAR OPERATOR

= often n-ary

→ 2AF4 // triple vertical bar binary relation

→ 2980 // triple vertical bar delimiter

2AFC // DOUBLE SOLIDUS OPERATOR

→ 2AF4 // parallel to

2AEF ⊤ WHITE VERTICAL BAR

= Dijkstra choice

2AFF ⊤ N-ARY WHITE VERTICAL BAR

= n-ary Dijkstra choice
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Narrow Foot Variant</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A3C</td>
<td>INTERIOR PRODUCT</td>
<td>tall variant with narrow foot</td>
</tr>
<tr>
<td>2A3D</td>
<td>RIGHTHAND INTERIOR PRODUCT</td>
<td>tall variant with narrow foot</td>
</tr>
<tr>
<td>2A9D</td>
<td>SIMILAR OR LESS-THAN</td>
<td>with similar following the slant of the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>upper leg</td>
</tr>
<tr>
<td>2A9E</td>
<td>SIMILAR OR GREATER-THAN</td>
<td>with similar following the slant of the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>upper leg</td>
</tr>
<tr>
<td>2AAC</td>
<td>SMALLER THAN OR EQUAL TO</td>
<td>with slanted equal</td>
</tr>
<tr>
<td>2AAD</td>
<td>LARGER THAN OR EQUAL TO</td>
<td>with slanted equal</td>
</tr>
<tr>
<td>2ACB</td>
<td>SUBSET OF ABOVE NOT EQUAL TO</td>
<td>with stroke through bottom members</td>
</tr>
<tr>
<td>2ACC</td>
<td>SUPERSET OF ABOVE NOT EQUAL TO</td>
<td>with stroke through bottom members</td>
</tr>
</tbody>
</table>